

METHOD OF MAKING A LAYERED COMPOSITE ELECTRODE/ELECTROLYTE

ABSTRACT

5 An electrode/electrolyte structure is prepared by a plurality of methods. An unsintered (possibly bisque fired) moderately catalytic electronically-conductive or homogeneous mixed ionic electronic conductive electrode material is deposited on a layer composed of a sintered or unsintered ionically-conductive electrolyte material prior to being sintered. A layer of particulate electrode material is deposited on an unsintered (“green”) layer of electrolyte 10 material and the electrode and electrolyte layers are sintered simultaneously, sometimes referred to as “co-firing,” under conditions suitable to fully densify the electrolyte while the electrode retains porosity. Or, the layer of particulate electrode material is deposited on a previously sintered layer of electrolyte, and then sintered. Subsequently, a catalytic material 15 is added to the electrode structure by infiltration of an electrolcatalyst precursor (e.g., a metal salt such as a transition metal nitrate). This may be followed by low temperature firing to convert the precursor to catalyst. The invention allows for an electrode with high electronic conductivity and sufficient catalytic activity to achieve high power density in an ionic (electrochemical) device such as fuel cells and electrolytic gas separation systems.